CLAIMS

1. A rigid arm lat pull down machine, comprising:

a main frame having a user support pivot mount, a forward end, and a rear end;

a user support frame pivotally mounted on the user support pivot mount for supporting a user in a seated position;

a user engagement means movably mounted on the frame for movement between a start position located above the head of a user in a seated position on the user support frame and an end position lower than the start position and generally below the user's chin;

a connecting linkage connecting movement of the user engagement means to movement of the user support frame; and

a load for resisting movement of at least one of the moving parts of the machine;

the combined motion of the user support frame and user engagement means between the start and end position substantially replicating the natural movement of the upper part of the human body when performing a free bar chin up exercise.

2. The machine as claimed in claim 1, wherein the user support frame has a start position corresponding to the start position of the user engagement means and an end position corresponding to the end position of the user engagement means, the start position of the user support frame comprising a rearwardly reclined position.

3. The machine as claimed in claim 2, wherein the end position of the user support frame is a forwardly inclined position.

4. The machine as claimed in claim 2, wherein the end position of the user support frame is an upright position.

5. The machine as claimed in claim 1, wherein the user engagement means is moveably mounted on the frame for rotation about an exercise arm pivot.

6. The machine as claimed in claim 5, wherein the exercise arm pivot is positioned forward of the user support.

7. The machine as claimed in claim 5, wherein the exercise arm pivot is positioned rearward of the user support.

8. The machine as claimed in claim 1, wherein the user support pivot mount is positioned at a predetermined location under the user support frame and beneath the user's body when supported on the frame, the pivot mount defining a vertical, gravitational center line, whereby movement of the user engagement device in an exercise movement simultaneously moves the user support frame between a start position and an end position, the user support pivot mount being positioned such that portions of the combined weight of the user and user support frame are distributed on each side of the gravitational centerline of the pivot mount in both the start and end position and only a portion of the combined weight passes through the gravitational centerline during the exercise movement.

9. The machine as claimed in claim 1, wherein the user support frame has a primary user support and a secondary user support held in fixed relative

locations throughout an exercise movement, the primary support comprising a seat pad.

10. The machine as claimed in claim 9, wherein the secondary support comprises a thigh hold down device.

11. The machine as claimed in claim 10, wherein the secondary support further comprises a back pad.

12. The machine as claimed in claim 10, wherein the thigh hold down device comprises pads.

13. The machine as claimed in claim 10, wherein the thigh hold down device comprises a seat belt.

14. The machine as claimed in claim 9, including an additional user support for supporting a different part of the user's body from the primary support and secondary support.

15. The machine as claimed in claim 14, wherein the additional user support is mounted on the user support frame and moves in fixed relationship with the primary and secondary supports.

16. The machine as claimed in claim 14, wherein the additional user support is mounted on the main frame and is fixed in position throughout an exercise movement.

17. The machine as claimed in claim 14, wherein the additional user support comprises a foot support for the user's feet.

18. The machine as claimed in claim 9, wherein the user support frame has a base and an upright, the primary user support being mounted on the base.

19. The machine as claimed in claim 1, wherein the user support frame defines an initial position for the user's body when supported on the frame in the start position of the exercise, and a finish position for the user's body in the end position of the exercise, the user support pivot mount defining a gravitational centerline extending through the user's thighs in each of said user positions.

20. The machine as claimed in claim 1, wherein the main frame has a base and the pivot mount is mounted on the base.

21. The machine as claimed in claim 1, wherein the user support pivot mount comprises a four bar linkage.

22. The machine as claimed in claim 1, wherein the user engagement device is movably mounted on the main frame.

23. The machine as claimed in claim 1, wherein the user engagement device comprises at least one rigid exercise arm.

24. The machine as claimed in claim 1, wherein the user engagement device comprises a pair of independently movable exercise arms.

25. The machine as claimed in claim 1, wherein the connecting link is a rigid link.

26. The machine as claimed in claim 25, wherein the connecting link has a first end pivoted to said user engagement device and a second end pivoted to said user support frame.

27. The machine as claimed in claim 1, including a slide member slidably mounted on said user support frame, the connecting link having an end pivoted to said slide member.

28. The machine as claimed in claim 1, wherein the connecting link comprises a first gear toothed cam mounted on said user engagement device, a second gear toothed cam mounted on said user support frame, and a sprocket rotatably mounted on said frame and meshing with said first and second gear toothed cams so as to link movement of said user engagement device with movement of said user support frame.

29. The machine as claimed in claim 1, wherein the connecting link comprises a moving wedge member movably engaged with said main frame and user support frame, and a connecting member pivotally connected to said user engagement device and said wedge member.

30. The machine as claimed in claim 1, wherein the load comprises a selectorized weight stack.

31. The machine as claimed in claim 1, wherein the load comprises weight plates.

32. The machine as claimed in claim 1, wherein the load is linked to said user support frame.

33. The machine as claimed in claim 1, wherein the load is linked to said user engagement means.

34. The machine as claimed in claim 1, wherein the load is linked to said connecting link.

35. The machine as claimed in claim 1, wherein the main frame has a base, the user support pivot mount being located on said base, and an upright strut spaced forward of said pivot mount and having an upper end, the user engaging means comprising an exercise arm pivotally mounted on said upper end of said upright strut and having a first portion extending from said exercise arm pivot towards the forward end of said frame and a second portion extending towards the rear end of said frame, and user engaging handles depending downwardly from said second portion above said user support frame for engagement by a user.

36. The machine as claimed in claim 35, further comprising a counterweight secured to the first portion of said exercise arm.

37. The machine as claimed in claim 36, wherein said load comprises a weight stack, said frame having a weight stack housing containing said weight stack and extending upwardly at the forward end of said frame, said counterweight being located above said weight stack housing.

38. The machine as claimed in claim 36, including a slide member slidably mounted on said upright strut, said connecting link comprising a first linkage connected between said user support frame and said slide

member, and a second linkage connected between said counterweight and said slide member.

39. The machine as claimed in claim 1, wherein said connecting link comprises a cable and pulley linkage between said exercise arm and said user support frame.

40. The machine as claimed in claim 35, wherein said connecting link comprises an elongate member having a first end pivotally secured to said exercise arm and a second end pivotally secured to said user support frame.

41. The machine as claimed in claim 35, wherein said connecting link is adjustable in length.

42. The machine as claimed in claim 35, wherein the load comprises a plurality of weight plates selectably mountable on the first portion of said exercise arm.

43. The machine as claimed in claim 1, wherein the main frame has a base, the user support pivot mount being located on said base, and an upright strut spaced forward of said pivot mount, the user engaging means comprising an exercise arm movably mounted on said upright strut for linear motion along said strut, the exercise arm projecting rearwardly from said upright strut above said user support frame, and having a downwardly depending handle for gripping by a user.

44. The machine as claimed in claim 1, wherein the main frame has a base, the user support pivot mount being located on said base, an upright

strut spaced rearward of said user support pivot mount, and said user support means comprising an exercise arm pivotally mounted on said upright strut for rotation about an exercise arm pivot, and having opposite arm portions extending forward from said exercise arm pivot on opposite sides of said user support frame, said opposite arm portions being located above a user seated on said user support frame in said exercise start position.

45. A lat pull down exercise machine for performing an exercise equivalent to a free bar chin up exercise, comprising:

a main frame having a forward end and a rear end;

a user support pivot mount on the main frame;

a user support frame pivotally mounted on the user support pivot mount, the pivot mount defining a vertical, gravitational center line of the pivotal movement, the user support frame comprising one moving part of the machine;

an exercise arm movably mounted on one of the frames for engagement by the user in performing exercises, the exercise arm having a user engaging portion, and comprising a second moving part of the machine;

a connecting link movably engaged with at least two of the main frame, user support frame and exercise arm for linking movement of the exercise arm to movement of the user support frame, the connecting link comprising a third moving part of the machine; and

a load for resisting movement of at least one of the moving parts of the machine;

the combined motion of the user support frame and user engagement means between the start and end position substantially

replicating the natural movement of the upper part of the human body when performing a free bar chin up exercise.

46. The machine as claimed in claim 45, wherein the user support pivot mount is positioned at a predetermined location under the user support frame and beneath the user's body when supported on the frame, such that portions of the combined weight of the user and user support frame are distributed on each side of the gravitational centerline of the pivot mount throughout the entire exercise movement between the start and end position, only a portion of the combined weight passing through the gravitational centerline during the exercise movement.

47. The machine as claimed in claim 45, wherein the exercise arm and user support frame are positioned relative to one another in the start position such that the user engaging portion is located above the head of a user seated on the user support frame whereby the user can grip the user engaging portion with their arms extending straight above their head and in line with the side centerline of their body, and are positioned relative to one another in the end position such that the user engaging portion is located below the chin and in front of the user's shoulders.

48. The machine as claimed in claim 45, wherein the user support frame is in a rearwardly reclined orientation in the start position.

49. The machine as claimed in claim 48, wherein the user support frame is in a forwardly inclined orientation in the end position.

50. The machine as claimed in claim 48, wherein the user support frame is in an upright orientation in the end position.

51. The machine as claimed in claim 45, wherein the exercise arm is movably mounted on the main frame.

52. The machine as claimed in claim 51, wherein the exercise arm is slidably mounted on the main frame.

53. The machine as claimed in claim 51, wherein the exercise arm is pivotally mounted on the main frame.

54. The machine as claimed in claim 53, wherein the exercise arm is pivotally mounted on the main frame for rotation about an exercise arm pivot axis at a location spaced above the user support frame.

55. The machine as claimed in claim 54, wherein the exercise arm pivot axis is spaced forward from the user support pivot mount.

56. The machine as claimed in claim 53, wherein the exercise arm is pivotally mounted on the main frame for rotation about a pivot axis spaced behind the user support frame and user support pivot mount, and has handle arms extending forward from the pivot axis on each side of the user support frame, the handle arms being spaced above the user support frame in the start position.